

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
TREE/SHRUB ESTABLISHMENT**

(Acre)

CODE 612

DEFINITION

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

PURPOSE

Establish woody plants for:

- forest products such as timber, pulpwood, etc.
- wildlife habitat
- long-term erosion control and improvement of water quality
- treating waste
- storing carbon in biomass
- reduce energy use
- develop renewable energy systems
- improving or restoring natural diversity
- enhancing aesthetics.

CONDITIONS WHERE PRACTICE APPLIES

Tree/shrub establishment can be applied on any appropriately prepared site where woody plants can be grown.

Utilize other practice standards for specialized tree/shrub establishment situations, e.g., Riparian Forest Buffer (391), Alley Cropping (311), Critical Area Planting (342), Hedgerow Planting (422).

CRITERIA

General Criteria Applicable to All Purposes

Composition of species will be adapted to site conditions and suitable for the planned purpose(s).

No plants on the Federal or state noxious weeds list shall be planted.

Planting or seeding rates will be adequate to accomplish the planned purpose.

Planting dates, and care in handling and planting of the seed, cuttings or seedlings will ensure that planted materials have an acceptable rate of survival.

Only viable, high-quality, and adapted planting stock or seed will be used.

A precondition for tree/shrub establishment is appropriately prepared sites. Refer to practice standard Tree/Shrub Site Preparation (490).

Adequate seed or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.

Selection of planting technique and timing will be appropriate for the site and soil conditions.

The acceptability and timing of coppice regeneration shall be based on species, age, and diameter.

The planting will be protected from plant and animal pests and fire. Refer to standards Herbaceous Weed Control (315), Brush Management (314) or Integrated Pest

Management (595) to assist with site-specific strategies for pest prevention, pest avoidance, pest monitoring, and pest suppression.

Each site will be evaluated to determine if mulching, supplemental water or other cultural treatments (e.g., tree protection devices, shade cards, brush mats) will be needed to assure adequate survival and growth.

Comply with applicable federal, state, and local laws and regulations during the installation, operation, and maintenance of this practice.

Additional Criteria for Treating Waste

Species used to treat waste shall have fast growth characteristics, extensive root systems, high nutrient uptake capacity and tolerance of the planned effluent.

Additional Criteria for Improving or Restoring Natural Diversity

Composition of species selected for planting or those favored for natural regeneration will be native to the site and create a successional stage or state that can progress to the potential natural plant community.

Additional Criteria for Improving or Restoring Natural Diversity

Species selected will be indigenous to the site and will reflect species composition of the desired stands.

Additional Criteria for Developing Renewable Energy Systems

Select plants that can provide adequate kinds and amounts of plant biomass to supply identified bioenergy needs.

Intensity and frequency of energy biomass removals will be managed to prevent long-term negative impacts on the system.

The harvesting of energy biomass shall be accomplished in a manner that will not

compromise the other intended purpose(s) and functions.

Additional Criteria to Reduce Energy Use

Orient trees to shade a building to reduce summer energy usage. The first priority is placement on the building's west side where the greatest daily heat gain occurs. The second priority is the east side.

Select plants with a potential height growth that will be taller than the structure or facility being protected.

Use proper plant densities to optimize the shade produced and meet energy reduction needs.

Trees planted within 30 to 50 ft of the building generally provide effective shade to windows and walls depending on tree height potential.

Keep trees at least 10 ft or further from the structure depending on mature crown spread, to avoid damage to foundations or restrict maintenance access to windows and walls.

Additional Criteria for Storing Carbon in Biomass

The species and plant communities that attain biomass more quickly will sequester carbon faster. The rate of carbon sequestration is enhanced as trees and/or shrubs mature and soil organic matter increases. Select plants that have higher rates of growth and potential for carbon sequestration in biomass and are adapted to the site. Plant species at the appropriate stocking rate for the site.

CONSIDERATIONS

Use locally adapted seed, seedlings, or cuttings. Priority will be given to plant materials that have been selected and tested in tree/shrub improvement programs. All plant materials should comply with a minimum standard, such as the American Nursery and

Landscape Association, Forest Service, or state-approved nursery.

Plans for landscape and beautification plantings should consider foliage color, season and color of flowering, and mature plant height.

Where multiple species are available to accomplish the planned objective, consideration should be given to selecting species combinations that best meet wildlife needs and pollinator needs.

Consider the need for future access lanes for the purpose of stand management when selecting tree/shrub arrangement and spacing.

Residual chemical carryover should be evaluated prior to planting.

Consider invasive potential when selecting species.

When used to treat waste consider species with fast growth characteristics, extensive root systems capable of high nutrient uptake, and ability to produce wood/fiber products in short rotations.

For optimal carbon storage consider species favored for building materials (lumber, furniture, etc) where sequestered carbon may be stored for multiple decades in structures and furnishing, and not recycled back into the ecosystem.

When underplanting, trees should be planted sufficiently in advance of overstory removal to ensure full establishment.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan or other acceptable documentation.

Plans and specifications will include adapted tree species for the purposes outlined, spacing, planting methods, cultural practices, maintenance requirements, and variations in methods and species between interplanting, underplanting, and planting in open areas. Separate specifications can be prepared for each of these planting methods.

OPEN AREA PLANTING

A. SPECIES

Usually, the species planted should be adapted to the site. Exceptions should be made only when the owner is willing to provide special management. Generally, native species already growing well in the area are good choices. The owner's ultimate choice will be affected by the desired end product. Nurserymen or appropriate specialists should be consulted for special purpose plantings.

The best suited trees for given soils are listed in the published soil survey for the county, the Web Soil Survey, or in the Soil Data Mart that can be accessed through Section II of the electronic Field Office Technical Guide.

B. SPACING

The spacing selected should depend on the type of crop expected, species, and cultural operations planned. In general, trees should be spaced so that they will make normal growth until the time of the first commercial harvest, which is usually a thinning cut.

1. Conifers planted for pulpwood, sawlogs, or other wood products should be spaced 8' x 8', 8' x 10', or 10' x 10' (726, 544, or 436 trees per acre). Areas prone to Southern Pine Beetle attack should be planted with 436 or less trees per acre.

2. Conifers planted for Christmas trees should be planted from 6' x 6' to 6' x 8' (1,210 to 908 trees per acre). Spacing should be adjusted as needed to accommodate mowing, shearing, spraying, and harvesting equipment.
3. Baldcypress and hardwoods planted for sawtimber should be spaced from 8' x 10' to 12' x 12' (545 to 302 trees per acre).
4. Black walnut for sawlogs should be spaced from 12' x 12' to 15' x 15' (302 to 194 trees per acre).
5. Black walnuts planted for nut production should be spaced 12' x 12' to 20' x 20' (302 to 109 trees per acre).

C. CARE OF PLANTING STOCK

With proper care, tree seedlings will stay fresh and healthy in the nursery bale for two to three weeks. When storing in bales, take the following precautions:

1. Keep in a cool room. Temperatures slightly above freezing are best.
2. Water weekly to keep roots and packing moist. Be sure to provide drainage for excess water. Poor drainage often results in heating from fungal activity.

If seedlings cannot be stored as described above, they may be heeled in. The following procedure should be used:

1. Select a cool, well drained, shady location.
2. Dig a V-trench with the sides at least as deep as the roots are long.
3. Break individual bundles apart and spread seedlings in a relatively thin layer in the ditch. Water seedlings well.

4. Cover with soil at least to root collar. Firm soil with foot, water again, and complete filling trench with loose soil.
5. Water as often as necessary to keep soil moist.

The following care should be taken during planting operations:

1. Take only as many seedlings to the field as you intend to plant in a day.
2. Keep seedlings covered and cool, and protect from sun and wind.
3. Keep seedling roots moist. Wet sphagnum moss around the roots is particularly helpful.
4. Never carry a group of seedlings in your hand while planting. The roots will be exposed and dry out.
5. At the end of the day, heel in loose seedlings or repack them in wet sphagnum moss in the nursery shipping bag.

The following care should be taken after planting the seedlings:

1. Grazing must be excluded from hardwood plantations until trees attain a height that damage from livestock is minimal (usually 15-20 years). Pine plantations must be protected from harmful grazing. (See Prescribed Grazing, Code 528A).
2. Fire protection is necessary in all plantations. Firebreaks should be established where needed. (See Firebreak, Code 394.)
3. Insects – Some of the most damaging insects to pine seedlings are:
 - (a) Southern Pine Beetle. This insect is attracted to southern yellow pines growing under stressed conditions. Overcrowding often leads to the trees becoming

stressed and then vulnerable to beetle attack. They feed on the cambium and adjacent tissues.

- (b) Pales Weevil. Freshly cut pine stumps attract this insect. They destroy pine seedlings by feeding on the bark and cambium. Losses are generally minor after six months have elapsed after harvesting.
- 4. Rodents - Field mice, moles, and rabbits are threats to seedlings planted in heavy grass or weeds. To minimize rodent damage, remove vegetation from within one foot of the seedling stem.

D. SITE PREPARATION

The kind and intensity of site preparation will vary according to the species to be planted, the type of cover on the site, and the erosion hazard. The objective is to reduce competition without removing or destroying topsoil and organic matter. See the standard for Forest Site Preparation (Code 490).

When conducting any practice that disturbs the soil, a strip of undisturbed vegetation will be planned along streambanks and major drainways (Streamside Management Zone – SMZ) to filter out sediment and remove nutrients from the in-ground water. For recommended widths, see Best Management Practices (BMP's) for Timber Harvesting in Tennessee, Division of Forestry, Tennessee Department of Agriculture.

E. PLANTING METHODS

Machine or hand planting with any tool that will accomplish satisfactory results is acceptable. Planting should be done

under favorable moisture conditions when soil is neither too dry nor too wet. Avoid freezing weather or frozen ground.

Seedlings roots must be kept moist once removed from the shipping bundle. Any loose seedlings left at the end of the planting day should be repacked in wet moss or be heeled-in.

1. Depth of Planting

Plant seedlings slightly deeper (1/2 to 1 inch) than they grew in the nursery. In excessively drained upland soils, deeper planting is necessary. Set cottonwood cuttings 10 to 12 inches deep, leaving 4 to 6 inches above the ground.

2. Position of Roots

Plant seedlings with roots down and spread out, not twisted, balled or U-shaped. Seedlings with long stringy roots may be pruned to a length convenient for planting.

3. Soil Firmness

Pack soil firmly around the roots to eliminate air pockets. A properly planted seedling will not come out of the ground when pulled moderately.

F. CULTIVATION

Ordinarily, most plantations do not require cultivation, particularly coniferous species. Cultivation generally will increase survival and early growth; however, the cultivation cost may exceed the return. Cultivation of cottonwood is essential for good survival and growth.

G. REPLANTING

Replanting should not be considered unless the ultimate value of the plantation is greatly reduced by understocking. Replanting should be completed with two years of original planting. Only consider replanting if survival

after one growing season is less than 70 percent.

H. INTERPLANTING

Interplantings may be used where openings one-fourth acre or larger exist within immature stands. The species planted should be based on the soils, site, and management objectives.

Spacing will be the same as recommended for open area plantings.

I. UNDERPLANTING

It is sometimes practical to improve stand composition by planting a more desirable species under an immature stand of low quality trees. The species planted should be adapted to the site as indicated in Section II of the Field Office Technical Guide. Spacing should be the same as in open fields. Underplantings should be released from overtopping trees and shrubs during the first growing season. If a mist blower is used to kill overtopping vegetation, spraying should be done the spring prior to planting.

J. PLANTING SEASONS

West Tennessee:
November 15 to April 1.

Remainder of Tennessee:
November 1 to April 15

OPERATION AND MAINTENANCE

The following actions shall be carried out to ensure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

If needed, competing vegetation will be controlled until the woody plants are established. Noxious weeds will be controlled.

Replanting will be required when survival is inadequate.

Supplemental water will be provided as needed.

The trees and shrubs will be inspected periodically and protected from adverse impacts including insects, diseases or competing vegetation, fire, and damage from livestock or wildlife.

Periodic applications of nutrients may be needed to maintain plant vigor.

REFERENCES

Metcalf, C. L. Destructive and Useful Insects. Fourth Edition. 1962.

NRCS. National Forestry Handbook. Feb. 2001.

NRCS. National Forestry Manual. Sept. 1998.

Society of American Foresters. Forestry Handbook. Second Edition. 1984.

Tennessee Department of Agriculture, Division of Forestry. Guide To Forestry Best Management Practices. 1993.